

Serial No. 10/783,499

Docket No. Zipfel 1

REMARKS**Substance of Interview**

Examiners Shingleton and Parker are thanked for the personal interview conducted with the undersigned on November 27, 2007. The substance of the interview is as stated in the Interview Summary prepared by Examiner Shingleton and is hereby incorporated by reference.

Declaration Under 37 C.F.R. 1.32

This paper is accompanied by a Declaration under 37 C.F.R. 1.32 by the inventor George G. Zipfel, Jr. The declaration has been signed by him using an S-signature per 37 C.F.R. 1.4(d)(2). Various sections of his Declaration are referenced hereinbelow

Claim Amendments

Independent claims 1, 9, 34 and 63 have been amended to more particularly define the invention. The ways in which these claims distinguish the invention from the cited prior art are discussed hereinbelow.

No new search is necessitated by these amendments and thus it is respectfully requested that any further Office action not be made FINAL. Specifically, the recitation in claim 1 that the currents sum to "zero" is a feature of the invention already presented in claims of this application, e.g., in claim 15. Moreover, the recitation in claim 9 (line 8), claim 34 (line 14) and claim 63 (line 20) calling for "substantially the same amount of current" is a slight change in language made to clarify the claimed subject matter. It is believed that the examiner has consistently interpreted the prior claim recitation "substantially all of the current" as meaning "substantially the same amount of current" as now recited so that, again, no new search is made necessary by this amendment.

In addition, claims 26 and 33 have been amended to more particular define the switching band components that cancel as being the "fundamental" component. Again, no new search is necessitated by these amendments. The specific reference to the fundamental component already appears in, for example, claim 63 (lines 16-18).

Serial No. 10/783,499

Docket No. Zipfel 1

Distinguishing Limitations

The following sections present the various ways in which particular claims distinguish the invention from the cited prior art. This discussion is, in large part, a review of the points previously made by applicant in prior Office action responses. The examiner's re-consideration of those points—several of which were specifically discussed at the interview and have been slated for re-consideration per the Interview Summary—is respectfully solicited and will be greatly appreciated.

For ease of reference, the various limitations relied on are used in the headings of the sections which follow and in the discussions themselves are referred to in general terms. Obviously, the examiner will want to examine the precise claim language.

Sum of the Currents is Substantially Zero—Claims 1, 15, 64

Amended claim 1 recites that the sum of the instantaneous values of the currents through the loads is substantially zero (lines 10-11). Claim 15 (lines 2-3) and claim 64 (lines 2-3) similarly recite that at substantially all times, those currents add to zero.

The accompanying Declaration under 37 CFR 1.32 by the applicant George Zipfel, Ph.D., provides an analysis of the Prokin circuit and demonstrates that Prokin does not meet this limitation. See Section I of Dr. Zipfel's declaration.

Same Amount of Current Flowing out of One Load Flows into the Other—Claims 9, 34, 63

Amended claim 9 (lines 7-9), amended claim 34 (lines 14-16) and amended claim 63 (lines 20-22) each recite that substantially the same amount of baseband current that flows out of one of the loads at a given time flows into the other. This recitation is a clarified variant of the prior recitation in each of the claims stating that all of the current flowing out of one of the loads at a given time flows into the other.

Dr. Zipfel's analysis in the accompanying Declaration further demonstrates that Prokin does not meet this limitation either. See Section II of Dr. Zipfel's declaration.

Serial No. 10/783,499

Docket No. Zipfel 1

In-Phase Switching Band Components —Claims 26, 33, 63

This is a limitation that was explicitly discussed at the interview in the context of claim 33, but similar recitations appear in claims 26 and 63.

Specifically, see claim 26 (line 5), claim 33 (line 5) and claim 63 (line 17).

This is directly counter to what is taught in Prokin, in which the fundamental switching frequency components are not of substantially the same phase but, in fact, the exact opposite phase, as section III of Dr. Zipfel's analysis explains.

Switching Band Components Cancel or Are Canceled—Claims 24, 33, 38, 39, 63

As is well known in the switching amplifier art, one needs to provide a way of isolating energy at switching frequencies from the loads, leaving substantially only the baseband signals to flow through the loads. Prokin accomplishes this in conventional fashion using low-pass filtering, e.g., inductors 41 and 42 of FIG. 15.

It remained for applicant to recognize that the bulk and expense of the filters used in a switching amplifier can be reduced by setting up the circuit in such a way that at least some of the switching energy of the two switching signals cancels (or is canceled), rather than being low-pass filtered.

It is perhaps possible that Prokin could be retrofitted to incorporate such cancellation by for example, by changing Prokin's switching fundamental frequency signals to be in-phase and to provide a common-mode rejection filter.

However, all of that would be the impermissible product of hindsight based on applicant's teachings. Contrary to applicant's claims, Prokin a) uses opposite-phased switching fundamentals and b) relies on straightforward low-pass filtering to block the switching frequency energy from the load(s).

These points are affirmed as correct in Section IV of Dr. Zipfel's declaration

Common-Mode Filter—Claims 36-39 and 63-68

Applicant's illustrative way of bringing about the above-mentioned cancellation is to have at least one switching frequency component of the two switching signals—

Serial No. 10/783,499

Docket No. Zipfel 1

illustratively at least the fundamental switching frequency component—be in phase with one another (as noted above) and to then use a common-mode inductor to effectuate the cancellation. Again, the advantage recognized by applicant is that the low pass filters typically used in switching amplifiers to isolate the switching frequency energy from the loads are thereby relieved from having to filter out the fundamental switching frequency energy, which is typically the highest-energy switching frequency component, allowing those filters to be smaller and less expensive.

Prokin's fundamental switching frequency signals are the exact opposite of common mode signals. They are differential mode (opposite-phased) signals. Thus Prokin's main goal vis-à-vis switching energy attenuation is necessarily to attenuate the differential mode fundamental. Since the desired baseband signals are also in differential mode, Prokin cannot use a differential mode filter because that would also cancel the signals that are to be applied to the loads. Thus Prokin relies on conventional uncoupled inductors such as filters 41 and 42. Those inductors will also attenuate the two components of whatever smaller common mode signals might be present, making it unnecessary to further complicate the circuit with any kind of common mode filter.

Dr. Zipfel's declaration confirms the foregoing in Section V.

Just as importantly, Dr. Zipfel's declaration in Section V explains that the person skilled in the art would not be led, based on such teachings of Sawashi, to include a common mode filter as taught by Sawashi because core saturation issues would mean that such circuitry would have to be bigger, more complex and more expensive than to use what Prokin actually in fact uses for switching energy suppression—namely uncoupled inductive filters like 41 and 42.

*Common-Mode Filter Cancels Fundamental
Switching Frequency Components—Claims 36, 39 and 63-68*

Dr. Zipfel's Declaration further points out in Section VI that even if one used Sawashi's teachings to implement some kind of common mode filtering in Prokin, the resulting combination would not be effective to cancel the fundamental switching frequency components, as is recited in claims 38, 39, and 63-68, because in Prokin those

Serial No. 10/783,499

Docket No. Zipfel 1

components are differential mode signals and thus not of the same phase. As to that point, reference may, again, be had to Section III of Dr. Zipfel's Declaration.

Passband Characteristic of Applicant's Load Filters (e.g., filters 39 and 43)—Claim 63

Lines 7 - 9 of claim 63 call for load filters with unique characteristics, specifically, "each load filter having a passband that includes said particular switching frequency and having a stop band at frequencies higher than said particular switching frequency." These are, for example, applicant's filters 39 and 43 of FIG. 4A. No such filters have such a characteristic are shown or suggested in Prokin.

This is a point that applicant has made several times during the course of prosecution but applicant has not found any response to this point in any of the issued Office actions. Applicant hereby renews this point once again and, indeed, applicant appreciates the examiner's specific attention to this issue as noted in the interview summary.

Withdrawn Claims

In view of the foregoing discussion indicating that the claims currently under examination are allowable, it is respectfully requested that the withdrawn claims be rejoined in this case and be allowed along with the claims now pending.

Reconsideration is requested.

George G. Zipfel, Jr.

By: _____
Ronald D. Slusky
Attorney for Applicant
Reg. No. 26,585
(212) 246-4546

Office of Ronald D. Slusky
Registered Patent Attorney
353 West 56th St—Suite 5L
New York, N.Y. 10019
Date: